

## Green Horse EA: Wildlife Descriptions

The following descriptions are for those species analyzed in the project as potentially impacted from the activities proposed in the Project. Status of species is obtained from the Forests' Monitoring Report (2013-2017).

### **Sensitive Species:**

#### **Bighorn Sheep**

Bighorn sheep are a sensitive species on the Nez Perce Forest, and considered as MIS for upland habitats that are composed of rocky and more open habitats. The sheep have been observed in river canyons, talus slopes, cliffs, open meadows, and clearcut or burnt forests (IDFG 2010). The sheep forage on grass, forbs and shrubs (Bodie et al. 1995). The sheep have been observed to avoid tall or overhanging vegetation that may block their view of predators (IDFG 2010).

Various studies have found that bighorn sheep responded favorably to timber harvest (Smith et al. 1999), and fire treatments (Dibb and Quinn 2008, Clapp and Beck 2016). The Project Area is not located in a population management unit as designated by the state in their Bighorn sheep management plan (IDFG 2010).

*Population Trends:* The sheep is rated G4 (global rank for apparently secure) and Idaho ranks this species as S1 (rare or uncommon, but not imperiled) (Nature Serve, 2019). The sheep's status on the forest is stable to decreasing, depending on the herd. (NPCNF\_MonRptWildlife 2013-2018)

#### **Black-backed Woodpecker**

The black-backed woodpecker is a Region 1 sensitive species found in post-fire areas and in areas of insect outbreaks. The woodpecker does not undergo latitude migrations as other species do, but responds to dramatic changes in forest structure such as fire and insect outbreaks. The bird is considered as an "Irruptive" species that forages on beetle larvae found in such disturbed areas (Dixon & Saab, 2000).

(Hutto & Patterson, 2016) noted the woodpecker's presence in a mixed fire event that contained moderate to low-severity burned areas that bordered the more severely burnt areas over an 11-year period. Presence of the woodpecker's occupancy in severely burned forest conditions was noted in many studies that suggested a 4-8 year post-fire window in southwestern Idaho (Dudley et al, 2012; Nappi et al. 2010; (Saab, Russell, & Dudley, 2007); (Hoyt & Hannon, 2002); (Murphy & Lehnhausen, 1998); and (Hutto, 1995). Research in Idaho fire events (Dudley et al, 2012; (Dudley & Saab, 2007); Saab and Dudley, 2007) found that beyond 8 years, food availability decreased and the foraging habitat declined rapidly. Potential wildlife snag habitat in ponderosa pine declined by over 50% in about 8 years after the fire event (Ritchie et al; 2013). The researchers also noted that the increase in downed woody material created a higher fire risk that potentially threatened the existence of the standing snags. Though mainly associated with burnt habitat, the woodpecker has been observed in various conifer-type forests. In unburned forests, woodborers and bark beetles are found primarily in areas that have undergone natural

disturbances, such as wind-throw, and within structurally diverse old-growth forests (Bull, Peterson, & Thomas, 1986), (Goggans, Dixon, & Seminara, 1988), (Hoffman, 1997), Tremblay et al, 2009. The species may also respond positively to lower intensity fires such as controlled burns (Russell et al., 2009).

*Population Trends:* The woodpecker is rated G5 (global rank for demonstrably widespread, abundant and secure) and Idaho ranks this species as S3 (rare or uncommon, but not imperiled) (Nature Serve, 2019). The bird was detected by vocal responses to surveys conducted by the IDFG in 2012. Fires on the forest from 2014-present have created thousands of acres of potential habitat for the woodpecker.

### **Fisher**

Fishers are associated with mature coniferous forests and specific structural elements; particularly large trees and coarse woody debris (Samson, 2006b; Ruggiero et al. 1994). They inhabit mesic, coniferous forest between 3,500–6,000 feet elevation, although habitat preference changes with season, age, and sex (Badry, 2004; NatureServe, 2019). Some researchers found that fishers did not select dry forest types with large representation of ponderosa or lodgepole pines (Schwartz et al. 2013, Olson et al. 2014). Many authors mention that fisher avoids open areas (Ruggiero et al. 1994; Weir and Corbould 2010; Schwartz et al. 2013; Sauder, 2014; and Sauder and Rachlow, 2014). Examples of such open areas include, grassy openings, meadows, and recently logged or severely burned areas within the past 15 years.

Fishers have a preference for structurally complex areas with multiple canopy layers, including understory shrubs and large amounts of woody debris (Ruggiero et al. 1994). Some research found that high elevation forested stands of lodgepole pine and sub-alpine fir were not considered as fisher habitat (Olsen et al. 2014). Fishers use "many different habitats for hunting as long as these areas provide overhead cover at either the stand or patch scales" (Weir and Harestead, 2003). Sufficient overhead cover in foraging habitat may be provided by either tree or shrub cover. Although fisher home ranges are consistently characterized by moderate to high proportions of mid- and late seral forests, there are few overarching patterns of selection for particular seral conditions or species compositions (Sauder and Rachlow, 2014). Raley et al. (2012) hypothesized that when fishers select home ranges, they benefit from including a diverse array of available forest conditions by increasing access to a greater diversity and abundance of prey species while still attaining habitat features important for reproduction and thermoregulation. Sauder and Rachlow's (2014) results are consistent with this contention.

For this analysis, potentially suitable habitat was determined using a model (Sauder, 2014) that combines three models of fisher habitat including: a climate model (Olson et al. 2014), a landscape-scale model (Sauder and Rachlow, 2014), and a home range scale model (Sauder and Rachlow, 2015). The Sauder (2014) model identifies relative probability of fisher occurrence and its continuity across the landscape. Modelled runs determined open areas, probable/general habitat and mature habitat. Open areas consisted of tree canopy cover at 10% or less: and were considered as habitats the fisher usually avoids (Sauder, 2014). Open areas contribute to fragmentation of the desired canopy cover for fisher. Fragmented open habitat consists of

isolated openings that are surrounded by probable fisher habitat. When these open areas reach a cumulative 5% or greater representation in the project area, they contribute to fragmentation of fisher habitat that is less than optimal for the predator (Sauder 2014, Sauder and Rachlow 2014).

Stands classified as having a mature, mesic-mixed conifer forest (determined by the species with the greatest abundance of canopy cover, basal area, or trees per acre) were selected and intersected with “probable habitat” by the Sauder (2014) model. Selection criteria for mature forests were those areas greater than 10 inches DBH.

In summary, the most current science for the Nez Perce-Clearwater National Forest recommends landscapes that have greater than 50% mature forest arranged in contiguous, complex shapes with few isolated patches, and open areas comprising less than 5% of the area appear to constitute a forest pattern occupied by fishers (Sauder 2014, Sauder and Rachlow 2014).

Fisher were detected on the NPNF during snow track surveys completed in 2007 (Ulizio et al. 2007) and 2009.

*Population Trends:* Fishers have a global ranking of G5 (global rank for demonstrably widespread, abundant and secure)) and a state rank of S2 (imperiled), (Nature Serve 2019). The fisher status on the Forest is considered stable. The USFWS reviewed the fisher’s status and found that the Northern Rocky Mountains population of fisher is “not in danger of extinction throughout all of its range.” (FR\_5Oct2017\_Fisher\_notwarranted)

### **Flammulated Owl**

The flammulated owl is a small raptor, considered a neotropical migrant, nests in tree cavities and preys on insects (Hayward & Verner, 1994), (Powers et al., 1996). The diet of this owl consists mostly of nocturnal moths and insects gleaned from open tree branches, taken on the wing, or picked up from the ground. One set of researchers (Linkhart, Reynolds, & Ryder, 1998) observed that 80% of intensive foraging areas were in old ponderosa pine and Douglas-fir mixed forest in Colorado. The owl forages in stands with low stem densities, moderately open canopies (35-65%), and very open understories. However, flammulated owls use dense foliage for roosting (Hayward and Verner, 1994). Roost sites may be found in multi-layered, mixed-conifer forests with a ponderosa pine or Douglas-fir component and pockets of dense foliage. Flammulated owl habitats in Idaho are typically mid-elevation mature or older open ponderosa pine and/or Douglas fir forest (IDFG 2005).

Nesting territories were estimated at about 124 acres in Idaho (Groves et al. 1997); and the owls are known to forage as much as 0.5 miles from their nest (Reynolds & Linkhart, 1992). Some evidence suggests that flammulated owls may form loose colonial groups or congregations for the purposes of breeding.

*Population Trends:* Nature Serve (2019) shows the flammulated owl has a rangewide rank of G4 (apparently secure), a state rank of S3B (vulnerable breeding). The owl is considered a sensitive species in by the Forest Service in Region 1. The Nez Perce Forest showed the highest occupancy of owls across the region (Cilimburg 2006).

### **Fringed Bat**

The fringed myotis is a species of greatest conservation need in Idaho (IDFG, 2005d). Similar to other bats, the fringed bat would utilize caves, mines, buildings, cliff faces, bridges, exfoliating tree bark, snags, and crevices in rocks as roost and hibernacula sites. Most of this habitat is not available or underrepresented in the Project Area: leaving large trees with protective bark and large snags as the primary roosting habitat components available in the analysis area.

The fringed myotis is often found in dry habitats where open areas are interspersed with mature forest, creating a complex mosaic with ample edges and abundant snags (Keinath et al, 2004). Ponderosa pine is an important species for providing potential habitat for the fringed myotis (Lacki and Baker, 2007; Keinath et al, 2004).

*Population Trends:* G4 (apparently secure globally), and S2 (imperiled in Idaho), according to Nature Serve 2019. The fringed myotis was one of the least common detected species during surveys in north Idaho (Romin and Bosworth, 2010). This information is consistent with the pattern of limited and patchy distribution that was the basis for including the fringed myotis on Idaho's list of species of greatest conservation need (IDFG, 2005).

### **Gray Wolf**

The gray wolf was listed as an endangered species in 1978. In the mid-1990s, gray wolves were introduced into central Idaho. By 2011 the USFWS finalized the delisting of the wolf in Idaho (IDFG and Nez Perce Tribe, 2014). The state wolf plan allows management/control of wolf levels at or above 15 packs (IDFG 2002). Below 15 packs in the state requires annual monitoring. An estimated 81 packs were present in the state during summer of 2016 (IDFG 2017).

Wolf habitat spans a broad range of elevations and habitat types. Key habitat components include: 1) a sufficient year-round prey base of ungulates and alternate prey; 2) suitable somewhat secluded denning and rendezvous sites; and 3) sufficient space with minimal exposure to humans (USDI, Fish & Wildlife Service, 1987).

The state is using elk management units for evaluation of wolf pressure (livestock depredations) on the ungulate. The Green Horse Project lies in two Game Management Units: GMU 16 elk predation in this Unit is considered moderate, and GMU 16A shows high levels of predation (IDFG 2017).

Habitat conditions that improve success for elk are also considered beneficial for the wolf. Denning/rendezvous sites, elk habitat effectiveness, and elk security areas (see Elk section) are used to assess existing conditions for wolves. By maintaining elk habitat effectiveness above minimum Forest Plan standards, providing elk security areas above minimum recommendations, and managing winter range to enhance forage productivity and quality would provide a sufficient prey base to sustain wolf populations at State objectives for the GMUs within the two management zones.

*Population Trends:* G5 (secure globally), S4 (apparently secure in Idaho), according to Nature Serve 2019.

### **Long legged & Long eared Bats**

Both bat species typically roost in snags, rock crevices, and caves. In forested areas, they have been found in snags and exfoliating tree bark. The long-legged myotis is more closely associated with coniferous forest habitat than the long-eared myotis. Both bats are known to forage together (Johnson, Lacki, & Baker, 2007).

The long-eared bat has been found roosting in the snags and stumps of Douglas-fir, western hemlock (Barclay & Kurta, 2007), western red cedar (Arnett & Hayes, 2009), and pine (Vonhof and Barclay, 1997).

Long-legged myotis are medium-sized bats that prefer large snags for roosting, but will also roost in live trees. Arnett and Hayes (2009) found that long-legged myotis infrequently roosted in snags or trees in stands <40 years old, and 58% of the snag roosts and 33% of the live tree roosts were located within riparian management buffers retained during harvest near small- and medium-sized perennial streams. Long-legged myotis roosted in snags in mid-seral (41-80 years) and old growth stands.

*Population Trends:* Nature Serve (2019) ranks the long-eared bat as G5- secure globally, and the long-legged bat as G4- apparently secure. Both species are considered in Idaho at the state rank of S3- rare or uncommon, but not imperiled.

### **Mountain Quail**

The species is associated with dry forest habitats that include shrubfields or grasslands located between upland or riparian habitats. Preferred habitat is dense thickets of rose, hawthorn, black currant, serviceberry, elderberry, blackberry, chokecherry and willow (Wisdom et al., 2000), Gutierrez and Delehanty 1999. They also use densely vegetated draws, shrubby understory and forest and meadow edges in open ponderosa pine and Douglas fir (Heekin and Reese, 1995). In Idaho, mountain quail habitat was dominated by tall shrubs that averaged 10 feet in height with an average canopy density of 45% that were within a few hundred feet of water. They occur most frequently in draws with shrub galleries along the breaks and secondary drainages of the Snake, Salmon, and Clearwater Rivers. Nests are primarily located within 200-300 yards of water since chicks require water soon after hatching (Wisdom et al., 2000). Known, recent locations on the Forest are in dry, low elevation, face drainages of the Salmon River. Mountain quail historically occurred in the project area.

Mountain quail breed and winter in warm and dry shrub-dominated communities (IDFG 2005). Healthy shrub-dominated riparian areas are important features of suitable habitat and provide corridors for quail to move to higher elevation breakland habitat in summer. Harsh winters contribute to higher mortality of quail due to their exposure to predators during their migration to lower elevations (Stephenson et al. 2011).

*Population Trends:* G5 (secure globally) and S2 (Imperiled) in Idaho (Nature Serve 2018). Remaining habitat areas are fragmented and populations often exist in isolated islands (Wisdom et al., 2000).

### **Western Toad**

Toads breed in temporary and permanent lakes, ponds, streams, and road ditches. They prefer shallow, warm areas with mud bottoms, and typically breed in May and June (Browne & Paszkowski 2018). Potential breeding and dispersal habitat occurs throughout the area along the network of riparian areas. They are largely terrestrial, but generally found within fair proximity to water.

Adult western toads are largely terrestrial and are very active at night. They have been known to move up to 1 mile from their breeding habitats, (Bartelt, Peterson, & Klaver, 2004) often into upland habitats (Bull, 2006). Toads selected south-facing slopes, preferred open sites to forested settings, and sites with high density of burrows, rocks, logs, or rootwads that provided cover (Bull 2006). Burned and harvested sites were not avoided by western toads in Bull's study. (Guscio, Hossack, Eby, & Corn, 2007) found western toad occurrence increased after wildfires and they used severely burned areas. Use shifted from severely burned to moderately burned areas in the late summer likely as a result of more ground/canopy cover and higher soil moistures.

*Population Trends:* The toad has a regional rank of G4 (apparently secure), and for Idaho the state rank is S2: imperiled (Nature Serve, 2019). Declines in abundance have been reported throughout the species' range due to disease and parasites.

### **Neotropical Migratory Birds**

Neotropical migratory birds are species that breed and rear their young in the United States and Canada, then migrate south to winter in Mexico, the Caribbean Islands, and Central and South America. Under the National Forest Management Act (NFMA), the Forest Service is directed to "provide for diversity of plant and animal communities based on the suitability and capability of the specific land area in order to meet overall multiple-use objectives" (P.L. 94-588, Sec 6 (g) (3) (B)). The January followed by the US Shorebird Conservation Plan and Executive Order 13186 (Brown et al. 2001), and the January 2004 PIF North American Landbird Conservation Plan (Rich et al., 2004) all reference goals and objectives for integrating bird conservation into forest management and planning.

In late 2008, a Memorandum of Understanding between the USDA Forest Service and the US Fish and Wildlife Service to Promote the Conservation of Migratory Birds was signed. The intent of the MOU is to strengthen migratory bird conservation through enhanced collaboration and cooperation between the Forest Service and the Fish and Wildlife Service as well as other federal, state, tribal and local governments. Within the National Forests, conservation of migratory birds focuses on providing a diversity of habitat conditions at multiple spatial scales and ensuring that bird conservation is addressed when planning for land management activities.

### **Management Indicator Species (MIS)**

### *American Marten*

The American marten is a Nez Perce Forest high elevation old growth MIS. American marten have a close association with late succession, mesic-dominated forests, especially those with uneven age structure and gaps in the canopy (Koehler & Hornocker, 1977); (Buskirk et al., 1994), Bull et al, 2005).

In the Idaho Panhandle and the Nez Perce-Clearwater Forests, the tree species in mature mesic forests associated with marten habitat include western red cedar, subalpine fir, Engelmann spruce, western larch, and lodgepole pine (T. N. Wasserman, Cushman, Schwartz, & Wallin, 2010), (Koehler & Hornocker, 1977), (Koehler et al, 1975). Locally, marten have been seen in ponderosa pine stands. Some studies have found that marten avoid open areas or demonstrate a decreased presence in clearcuts or fragmented habitats (Shirk, Raphael, & Cushman, 2014), (Tzeidle N. Wasserman, Cushman, Wallin, & Hayden, 2012) Moriarty et al, 2011; Potvin et al, 2000; ( Buskirk et al., 1994) Koehler et al, 1975). Roads would also contribute to fragmentation. Open meadows and burns, may be avoided by marten in the winter, but are used in the summer and fall seasons if they provide adequate cover and food. The high occurrence of fruits, insects, and ground squirrels in the summer-fall diet offers evidence marten use open areas. Voles, which occurred in 71 percent of the summer-fall diet, were abundant in mesic sites within meadows and burns. Koehler and Hornocker 1977.

Tree canopy cover has varied between 30 to 100%, depending on the location and type of study conducted by the researcher(s). Some researchers recognized marten's need for a closed tree canopy at 30% canopy cover or greater (Koehler et al, 1975; Koehler and Hornocker, 1977; (Hargis et al. 1999). Other studies showed that marten prefer a minimal canopy cover of greater than 73% (Shirk et al., 2014), at least 60% or greater (T. Chapin, G., Harrison, & Katnik, 1998), at least 50% or greater (Snyder and Bissonette, 1987; Bull et al. 2005), at least 45% or greater (Webb and Boyce, 2009), and greater than 40% (Tzeidle N. Wasserman et al., 2012).

Marten habitat may be more associated with complex vertical and horizontal woody structure, as opposed to forests of a particular age, species, or overstory requirement (T. G. Chapin, Harrison, & Phillips, 1997). Examples of research that is moving away from past methods of habitat characterization include: Spatial scaling and multi-model inference of landscape patterns used for analyzing gene flow processes (T. N. Wasserman et al., 2010), and interpreting relationships of marten occurrence across a special scales or habitat variables (Tzeidle N. Wasserman et al., 2012)and spatial/temporal variations in marten selection of resources (Shirk et al., 2014).

Marten have been detected on the NPNF during snow track surveys completed in 2007 (Ulizio et al. 2007). Hair snare surveys (5 transects) that were completed during summer and fall of 2008 on the Forest following the protocol established by McKelvey et al. (1999) also detected marten.

*Population Trends:* The American marten is considered as G5 (secure) global status, and S5 (secure) status in Idaho (Nature Serve, 2019). The animal is considered a furbearer and can be legally trapped in the state of Idaho. The marten's status on the Forest is considered stable. (NPCNF\_MonRptWildlife 2013-2018)

### *Northern Goshawk*

The northern goshawk was identified as a Forest MIS for old-growth forest. Goshawks use large landscapes, integrating a diversity of vegetation types over several spatial scales to meet their life-cycle needs (John R. Squires & Kennedy, 2006). In “The Northern Goshawk Status Review,” the USFWS found that the goshawk typically uses mature forest or larger trees for nesting habitat; however, it is considered a forest habitat generalist at larger spatial scales (USDIFWS, 1998). The FWS found no evidence that the goshawk is dependent on large, unbroken tracts of “old growth or mature forest.”

Goshawks prey in habitats that contain snags, downed logs, woody debris, large trees, herbaceous and shrubby understories, and a mixture of stand structural stages (Wisdom et al., 2000). Foraging habitat for goshawks may occur along the edges of open areas; such as meadows, burned areas, timber units, streams and roads. Forage habitat is not considered limiting factor for the raptor on this Forest.

An Idaho study found that goshawk breeding home ranges in northern Idaho are about 12,720 acres for males; 9,540 acres for females (Moser, 2007). The Green Horse Project area appears to be the size for a female breeding range, containing about 2,496 acres of potential nesting habitat.

Nest areas are usually mature forest with large trees, relatively closed canopies (60-90%) and open understories (Squires and Kennedy, 2006). In central Idaho, goshawks nest in a variety of forest stands that are comprised of mature trees with relatively high canopy cover and open understories (Moser and Garton 2009, and Moser 2007). Favored habitats typically are located in forest stands having only 1 or 2 canopy levels with an open or mixed-density understory (ibid). The researchers found the average size of a nesting area in his Idaho study at around 170 ha, or 420 acres.

Nesting habitat was chosen indicator as it is the primary limiting factor for goshawks and is represented by a much narrower range of vegetation structure and composition than the post-fledgling areas and forage area.

Home ranges are likely not defended from other goshawks, with the exceptions of the nest area and post-fledging area (Brewer, Bush, Canfield, & Dohmen, 2009). Home ranges of adjacent pairs may overlap (J. R. Squires & Reynolds, 1997); Squires and Kennedy, 2006). Goshawks have been found to use the same nesting area for decades, and goshawk territories typically contain a number of alternate nests (Moser, 2007). Goshawks appear to range over large areas and use a variety of habitats outside of the nesting area (Kennedy, 2003).

A 2005 survey of the frequency of northern goshawk presence in the Northern region found that based on a random sample (n=114) of 12,350 sampling units, goshawks were detected in 39% of available habitat in road-accessible areas in Region 1 (Kowalski 2005, Brewer et al. 2009). The results suggest that goshawks are relatively common and widely distributed in the roaded, managed portions of National Forest lands.

Population Trends: The goshawk is rated secure across its range (global rank G5) and S3 in Idaho; which is rare or uncommon, but not imperiled (Nature Serve 2019). The status of the raptor on the Forest is considered as stable (NPCNF\_MonRptWildlife 2013-2018).



### **Pileated Woodpecker**

The pileated woodpecker is another Nez Perce National Forest management indicator species for old growth forest and large snag habitat. Pileated woodpeckers are large, cavity-nesting birds associated with late successional stage forests, but also may use younger forests that have scattered, large, dead trees (Bull & Jackson, 1995). The woodpecker is common in both cut and uncut mid-elevation forests, and appear to do well in a matrix of forest types (Hutto, 1995a). One group of researchers conducted a study on the density of pileated woodpecker nesting pairs in areas before and after timber harvest activities (Bull et al. 2007). In six of the seven study areas, the density of the nesting pairs were unchanged, or increased or decreased by only one pair. In these sampled areas, the amount of mature and old forests decreased by less than 25%, with consistent pileated woodpecker densities.

Feeding habitat for pileated woodpeckers is highly dependent on the availability of carpenter ants which make up the majority of their food supply (Aney & McClelland, 1990). Preferred feeding habitats have high densities of snags and logs, dense canopies, and tall ground cover, with more than 10% of the ground area covered by logs.

The current condition of nesting habitat is considered the most limiting factor for pileated woodpeckers. Nesting habitat is a more specialized range of vegetation structure and composition than the stand age and structure for foraging habitat. The nest tree is the most important variable to estimate breeding habitat use by the pileated woodpecker (Kirk & Naylor, 1996); (Giese & Cuthbert, 2003).

The mean size of nest trees ranged from 28" dbh in Montana (Aney and McClelland, 1990) to 33" dbh in Oregon (Bull and Jackson, 1995). The minimum canopy cover selected by pileated woodpeckers for nesting stands ranges from 15 to 60 percent depending on the habitat type (Bull, Holthausen, & Henjum, 1992), (Bull & Holthausen, 1993); (Bonar, 2001).

Territories of nesting pairs cover 500-1000 acres in Montana, 1000-1300 acres in western Oregon, 320-600 acres in northeastern Oregon (Aney and McClelland, 1990), and about 1,000 acres in another Oregon study (Bull and Holthausen, 1993). Not every stand within a bird's home range is used as feeding habitat, and the range of a nesting pair is partly determined by the amount of suitable feeding habitat in proximity to the nest site.

*Population Trends:* The pileated woodpecker is rated secure across its range (global rank G5) and apparently secure (state rank S4) in the state of Idaho (Nature Serve, 2019). The NPNF has approximately 299,667 acres of nesting habitat, and 444,789 acres of foraging habitat well distributed to support pileated woodpeckers (Bush and Lundberg 2008). The status of the raptor on the Forest is considered as stable (NPCNF\_MonRptWildlife 2013-2018)

### **Rocky Mountain Elk**

Elk is a management indicator species for commonly hunted big game species, and an MIS for general forest seral species easily affected by management activities on the Nez Perce National Forest.

Elk are habitat generalists and use a diversity of forest types and structures that provide forage and hiding cover (Unsworth, Kuck, Garton, & Butterfield, 1998). They forage in meadows and early seral communities from spring through early summer, use more closed canopies from late summer through fall, and rely upon low elevation, warm aspect, and snow-free or snow-limited areas for foraging in the winter. Adult bulls often winter at much higher elevations than cows and immature elk.

Roads built into elk habitat increase hunter access, increasing elk vulnerability to harvest (Unsworth, Kuck, Scott, & Garton, 1993), (Christensen, Lyon, & Unsworth, 1993). Other literature on elk modelling has suggested buffers for road effects (D. H. Ranglack et al., 2017) Frair et al, 2008; (M. M. Rowland, Wisdom, Johnson, & Penninger, 2005), (M. M. Rowland, Wisdom, Johnson, & Kie, 2000), size of elk unit to be analyzed (Rowland et al, 2005; Boyce et al, 2003; Unsworth et al. 1998; Christensen et al, 1993), the influence of different road types on elk space use across seasons and by sex (Montgomery et al. 2012), and other elk habitat considerations. Field observations by the biologist, other forest personnel and public individuals show that elk may use roads as evidenced by elk tracks seen on roads. In some cases creation of temporary roads on ridges may be used by elk as game trails.

*Population Trends:* The elk is rated secure across its range (global rank G5) and apparently secure (state rank S4) in the state of Idaho (Nature Serve, 2019).

### **Shiras Moose**

Moose are a Forest MIS representing hunted big game species and old-growth/Pacific yew habitats. Moose in north-central Idaho select dense Pacific yew stands in old-growth grand fir communities during winter (Pierce and Peek 1984). Suitable habitats are characterized by an overstory of old growth grand fir and an understory of Pacific yew (a primary winter forage species for moose). An increase in the frequency and extent of yew has likely resulted from fire suppression; however timber harvest has likely reduced it in these same areas. Pacific yew was typically slashed and burned during regeneration timber harvest practices prior to 1987 (Crawford 1983 and Stickney 1980). From 1987 to 1991, harvest and burning were constrained in areas allocated to moose winter range.

One recent study on moose diet found that shrubs preferred by moose in Idaho included willow species, bittercherry, ninebark and ceanothus spp. Pacific yew represented about 21% of the diet, and the tree species of western cedar and western hemlock contributed to more than 3% of the dietary proportion (Schremp, 2017). The author noted other species consumed, which were other shrubs.

*Population Trends:* The moose is rated secure across its range (global rank G5) and vulnerable (state rank S3) in the state of Idaho (Nature Serve, 2019). Moose have been declining in the Clearwater Region over the past few years, which may be due to forage quality/quantity, parasites and predation (IDFG\_Moose\_2018).